Monitoring and Modeling Indoor Air Toxics

EPA Workshop on Air Toxics Exposure Assessment

John Girman

Indoor Environments Division

EPA/OAR/ORIA

Monitoring vs. Modeling Indoor Air Toxics

- Monitoring probably used more frequently than modeling for indoor air toxics exposure assessment
- Generally monitoring data more available than model inputs
- Mass balance modeling frequently used to analyze experimental (laboratory/chamber) results and to assess concentration/ventilation studies

Modeling Indoor Air Toxics

- Good mass-balance models exist for indoor air, for example
  - Contamw model developed by NIST
    - Building-based model
    - Multi-compartment (assumes well-mixed chambers)
    - Default inputs
    - Available from web (http://bfrl.nist.gov/iaqanalysis
  - EPA RISK model developed by NRMRL
    - Multi-chamber model (assumes well-mixed chambers)
    - Calculates risk (using NCEA spreadsheet)
    - Default inputs (also variable source inputs)
    - Available as CD (sparks.les@epa.gov)
  - Many CFD models used

Monitoring Indoor Air Toxics

- Many monitoring studies conducted
  - VOC, PM (including PAH, heavy metals), pesticides
- Variety of indoor environments
  - Office buildings
    - BASE, TIME, Cal Healthy Building Study, European Studies
  - Schools
    - Limited number of studies
  - Residential
    - TEAM, Six Cities Study, NOPES, NHEXAS

Monitoring Needs for Indoor Air Toxics

- Study design
- Sampling equipment
- Analytical support
- Protocol
- QA/QC
- Sample pool (access)
- Time resolution

Modeling Needs for Indoor Air Toxics

- Model
- Ventilation rates
- Building volumes (multi-chamber)
- Activity patterns
- Emission rates
- Loss rates (deposition, reactions, filtering)
- Outdoor/indoor penetration factors